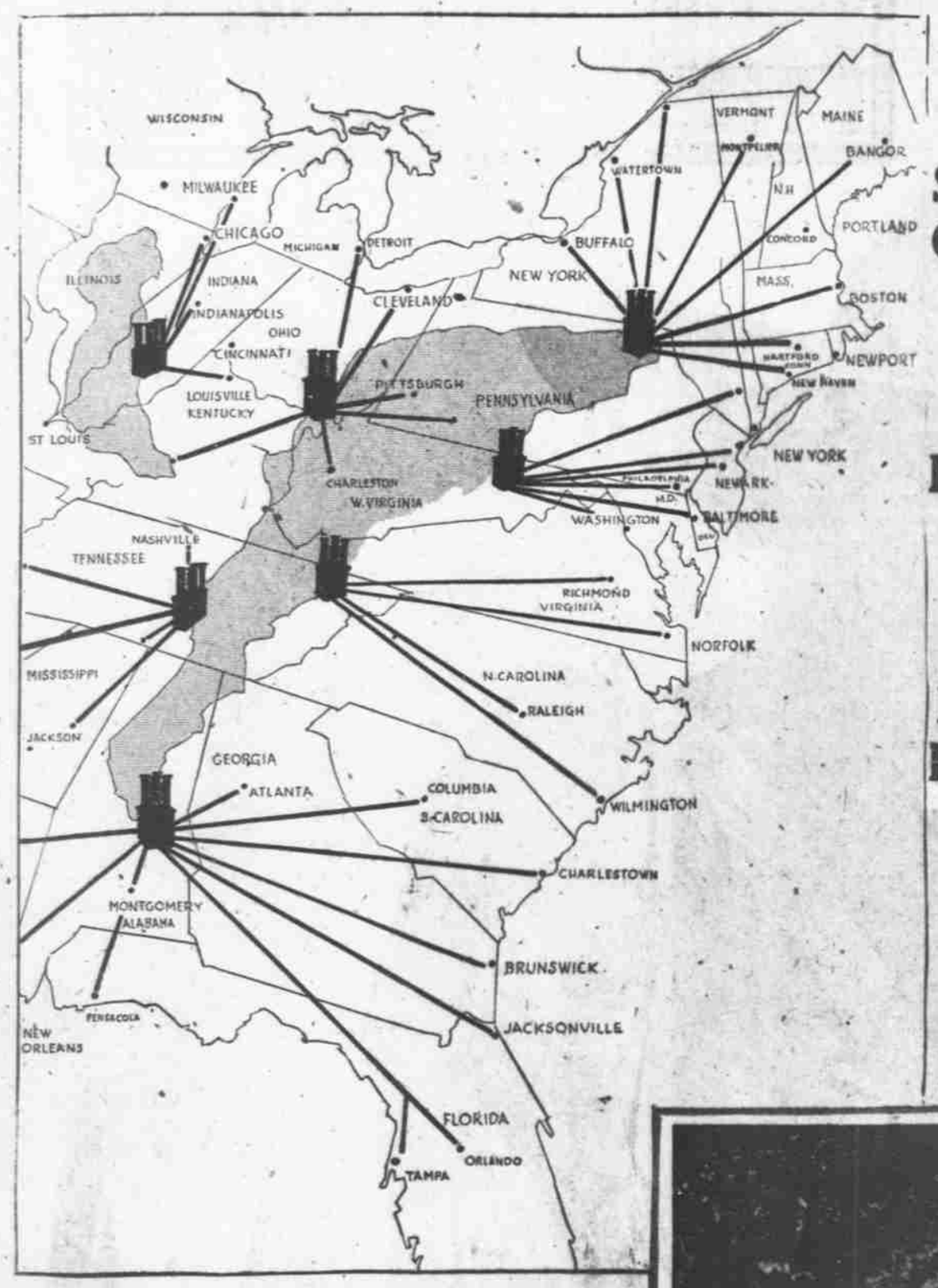
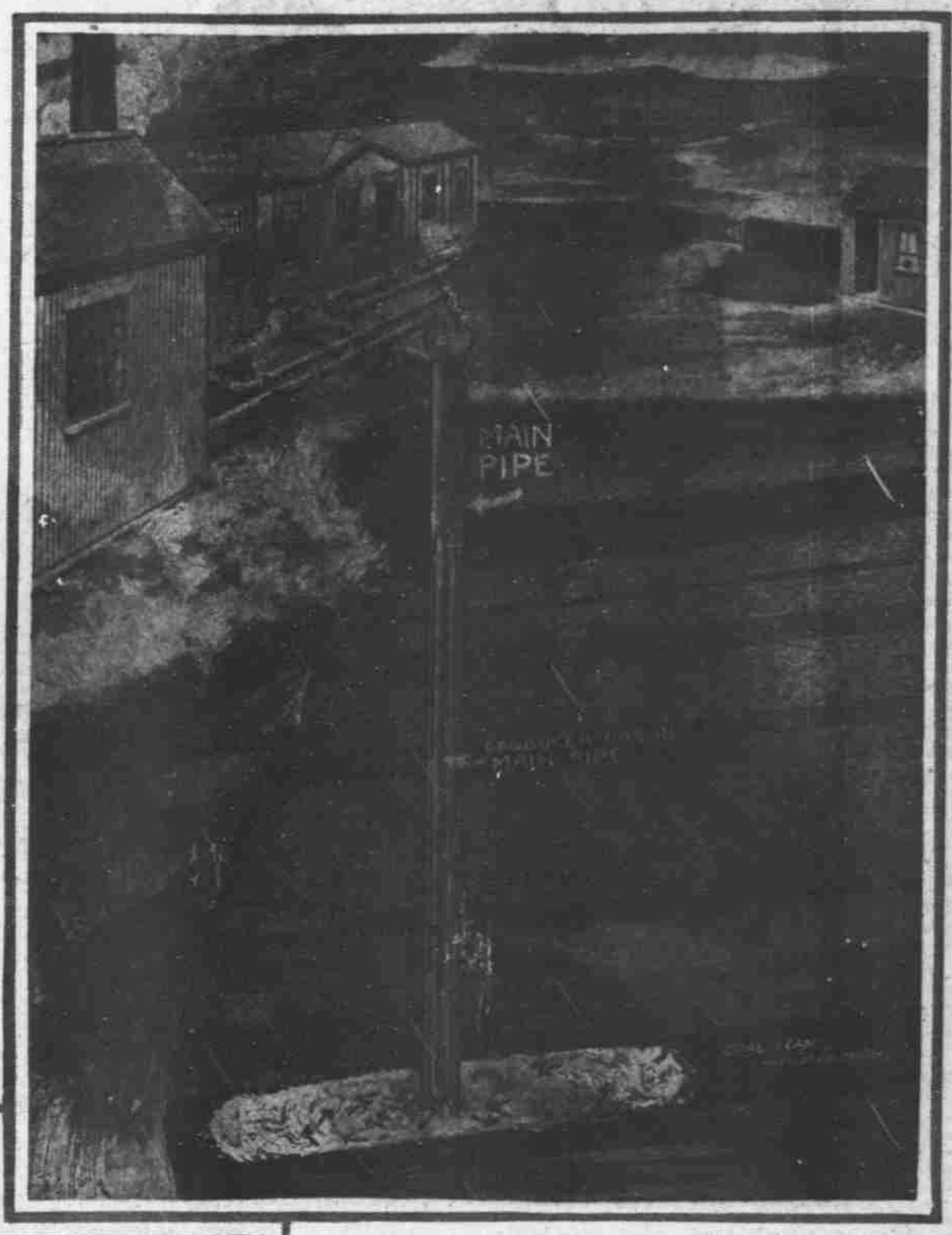
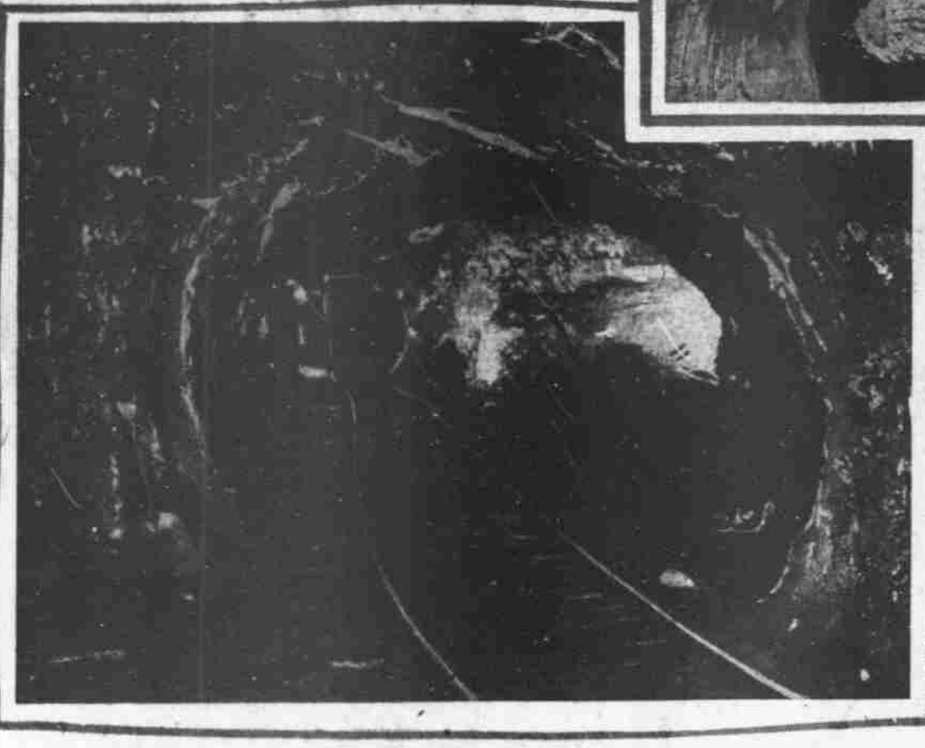
# Our Heat and Power Direct From The Coal Mines?




**Pictorial Map from U. S. Survey Showing How All Important Eastern Cities and Factory Towns Could Be Supplied by Electricity Generated by Great Power Plants Built in the Coal Fields and Thus Save Hauling the Coal.**

## United States Government Survey to Find Out If We Can Build Giant Power Plants in the Coal Fields, Transmit the Electricity by Wire, and Save the Railroads from Hauling Coal—and Perhaps Get Along Without Miners



**Photograph of a Pennsylvania Coal Vein, One Mile Under Ground.**

By Rene Bache.

HOW about the idea of "electrifying" New York, Chicago, and other American cities by transmitting power over wires to those centers of population direct from the mouths of our coal mines?

Why carry coal by rail? Why not burn it at the mouth of the mine, and convert its energy into electricity, for "shipment" by wire?

Why waste vast sums of money in transporting hundreds of millions of tons of coal annually as freight when the energy it represents might just as well be forwarded in the shape of an invisible "juice," requiring no cars?

Cars are mighty precious these days. Trackage sorely needed for other purposes is blocked with coal trains. Half the total tonnage carried by our railroads is coal. If even part of the coal transportation were cut out, there would be just that much more tonnage available for other uses.

Is the idea practicable? Well, Uncle Sam thinks so. In fact, he is even now taking steps to carry it out.

To start with, Fuel Administrator Garfield has authorized the immediate making of surveys, to determine the practicability of establishing great generating stations at suitable points in coal-producing districts, and transmitting electric energy to industrial centers.

If (as is confidently expected), the plan proves feasible, the big seaboard cities will be electrified first. New York—the greatest power-utilization center in the world—is, of course, most important.

All of eastern Pennsylvania might easily be electrified from the anthracite mines of that State; and wires from the same source could economically run all the factory machinery in Greater New York, propel the surface, elevated, and subway trains, illuminate the metropolis, and lift the elevators in the skyscrapers.

The whole project is to be financed by the Federal Government. It will, in a word, link up the coal mines with the cities, furnishing the latter with energy utilizable for every purpose—heating and cooking quite possibly included.

Experimental? Well, hardly that. The practicability of the idea has been fairly well proved.

Take, for example, an outfit that was established not very long ago at Windsor Locks, on the Ohio River. It is located at the mouth of a coal mine, and is one of the most modern steam plants in the United States.

The wires of this plant extend over hundreds of square miles in West Virginia, and as far as Pittsburgh, Pa. It develops power that is actually cheaper than water-power, being sold for one-third of a cent per kilowatt-hour!

So much for that. Now, how about the distance over which electricity may be economically carried?

A commercially successful concern located at Rush Creek, Cal., on the eastern slope of the Sierras, transmits electricity all the way to Yuma, Ariz., a distance of 548 miles. The "juice" is used all along the line for lighting, small power, irrigation, etc.

That is water power. But a steam plant located at the mouth of a coal mine can send electricity quite as far. It can transmit electricity at a profit at least half as far.

The longer the distance, the bigger the wire required to carry the current. If the distance be 300 miles, the line will cost more than the power plant.

Cost of long-distance transmission has hitherto held back the development of such electrical enterprises. But the difficulty has been largely removed. Efficiency of transmission has been steadily and rapidly increased, and the cost proportionately reduced.

An instrument very importantly working to this end is the steam turbine. It has more than helped to make steam-produced electricity rival water-power electricity. How much the former has been cheapened may be judged from the fact that a steam "central station," for producing electricity from coal, has recently been established close by Niagara Falls, and in competition with the cataract.

One big concern—mainly from a great power plant in Chicago—supplies nearly the whole State of Illinois with electricity. The Pennsylvania system and other railroads have electrified their lines from central stations. But such power stations, where coal is collected in vast quantities and burned for the making and distribution of electricity, obviously represent a step in the direction of the mine-mouth—the original source of energy.

The railroads, while transporting and distributing coal for all sorts of purposes, themselves consume an immense deal of it. A very large part of the fuel they carry is burned in their own locomotives. Why carry this coal?

Why not run the trains by electricity obtained direct from the coal mines? Experts declare that there is no serious difficulty involved.

They say there is no reason why the transcontinental railroads should not be operated all the way from the Atlantic to the Pacific coast by electricity supplied from suitably located power stations.

Suppose the stations to be 300 miles apart. That would require a transmission of only 150 miles east and west from each station. No trouble at all.

Coal is produced in thirty States of the Union. There is no lack of mines utilizable for the purpose. But, where transcontinental roads are concerned, the burden of transportation borne by the coal deposits in the East and Middle West would be taken up by waterpower in the Rocky Mountain region and thence westward.

In either case the same idea would govern. Electricity produced at the dam site, or at the mine-mouth—the principle of getting energy from the original source is the same. The proposition is to utilize the coal mine substantially as the waterfall has for quite a while been dealt with.

Now let us go back to the population centres. Boston and other important industrial cities of New England could be electrified from the anthracite beds of eastern Pennsylvania. Even the trolleys connecting those towns might be operated by "juice" fetched over wires from that source.

Nearly all of the western half of Pennsylvania is underlaid by beds of "bituminous," and the same coal formation extends far into Ohio and southward through West Virginia, Kentucky, Virginia, Tennessee and northern Alabama. From that source (with great power plants established at mine-mouths in suitable places) unlimited supplies of electricity could be obtained for all the cities and towns of the East, south of Philadelphia, which would naturally draw upon the nearby anthracite fields.

Further west, another coal field underlies nearly all of Illinois, extending eastward and southward into Indiana and Kentucky. Yet another, of vast area, stretches all the way from northern Iowa through Missouri, southeastern Kansas, eastern Oklahoma and northern Texas.

Over the entire eastern half of the United States rich coal deposits are so distributed that, from mine-mouth station, they could furnish unlimited cheap electricity for every population centre of any importance.

Before very long this is bound to become an accomplished fact, and we shall look back with astonishment at our foolishness in carrying mountains of coal over millions of miles when we might have got the energy out of it just as well, and in the most easily utilizable form, by burning it at the point of production.

The "juice" coming direct from the coal mine to a city will be delivered at sub-stations, each taking a certain amount of current off the wire and supplying a given area with just what it needs for lighting, running machinery and other purposes.

It will be very cheap electricity—for one reason, because enormous quantities of refuse coal can be used for its production. A large part of the output of a coal mine is waste, mostly coal-dust, which is thrown aside because there is no market demand for it. It is perfectly good coal, with as high a fuel value as that shipped in lumps, but nobody wants it.

Veritable mountains of this refuse coal have been built up at the mine mouths. In view of the plan now contemplated, they suddenly assume the aspect of great stores of accumulated wealth. For twenty-five years engineers have been considering the possibility of using this waste for long-distance transmission of electric power, and now at last the idea is to be carried out.

Under the shadow of one coal-dust mountain containing about 2,000,000 tons, in Luzerne County, Pa., a big power plant was set up a while ago, with huge turbo-generators and boilers, for the production of electricity. The dust is taken from the pile and carried by electrically-driven conveyors to the top of a tower, where it is dried, weighed and loaded automatically into other conveyors which transport it to the boiler room. This outfit does a wholesale and retail electric power and lighting business over a radius of thirty miles, serving 40,000 people.

Here is a beginning already. It offers merely a suggestion of what may be accomplished when the business is taken in hand on a great scale.

Leaving waste aside, the poorer the coal, the higher is the cost of transporting it relatively to its value as fuel. This is a self-evident proposition. But the inference to be drawn is that, for the production of long-distance current, it pays better to burn poor coal than good coal. The cost of transmitting electric power is the same whether it be derived from the finest anthracite or the meanest lignite, but the former may be profitably shipped a much greater distance than the latter.

Hence it is obvious that if it pays to burn anthracite at the mine-mouth for making electricity, a much greater relative saving will be accomplished by applying the same idea to the low-grade bituminous coals of the Middle West and the lignites of other regions. The problem is one of transportation, the copper wire competing with the iron rail.

It is a picturesque notion, that of picking up power out of the coal-mine and carrying it on wires over great distances. Put on the wires at a high voltage, it is "steeped down" before delivery to consumers.

Had it not been for the war there is no telling how long we might have had to wait for civilization to take this important step forward. But the war has given an impetus to many things, hurrying them along. Economic necessity is spurring the Government to quick action. As a result, our principal Atlantic seaport cities from Boston to Norfolk are likely to be supplied with electricity from the coal mines before the war comes to an end.

Whenever and wherever this wonderful improvement is accomplished it will doubtless bring about many changes which it would not now occur to us to think of. But one great change that it is plainly destined to effect is in making our cities smokeless. To municipalities that are obliged to depend upon "soft" coal this will be an enormous benefit. Even Pittsburgh will be clean.

Even more interesting are the experiments about to be undertaken in England to test out the suggestion of the famous scientist, Sir William Ramsay.

Professor Ramsay declares:

"There is absolutely nothing to prevent a bore hole from being put down until the coal stratum is reached and concentric tubes being used to set the coal on fire (by electricity) and to blow air down to enable the coal to burn as a preliminary operation. When sufficient heat had been engendered the amount of air sent down might be restricted. Coal with plenty of air gives off carbon di-oxide. When half burned it gives off what is called Dowson's gas, which is used for gas engines. If steam were blown in it would give a mixture of hydrogen and carbonic oxide, or water gas, which also is frequently used for gas engines.

"Bring your gas engines to the mouth of your pit or bore hole and produce your power there. You would thus have 30 per cent of the energy of the coal available, as against 15 per cent available in fuel engines. That energy might be transformed into electricity at the mouth of the bore hole, and you could distribute it through the country—wherever you liked. There is nothing new in this. Electricity has been carried 200 miles in California. I myself have seen it carried eighty miles in Mysore in Indiana. In this way you would get electricity available for lighting and heating (including domestic heating), your railways would be worked by electricity, and the only fuel you would require would be oil for ships."

This would save the whole operation of mining coal, save millions of dollars and free thousands of miners for other useful occupations.

## *To Avoid Mining Coal*

**Sir William Ramsay's Suggestion for Burning Coal in Its Place in the Depths of the Earth to Produce Gas Conveyed by Pipe to Engines in a Power House on the Surface. A Simple Diagram Illustrating Sir William Ramsay's Startling Suggestion That It May Become Unnecessary to Dig for Coal.**